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—THE— CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The Canadian Contract Record),

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64 TEMPLE BUILDING, MONTREAL.

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Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

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THE first step towards affording free technical instruction to the artisan classes was taken in Toronto at the beginning of the present year, when the City Council made a grant for the purpose. The results are said to be very satisfactory, and such as to warrant the continuance of the undertaking. The attendance has not been far short of two hundred, and it is gratifying to learn that a large proportion of the students have come from the ranks of workmen connected with the building trades.

IN a letter published in this number an architect asks for information concerning the varieties of Canadian building stones and the names of quarry owners, and expresses surprise that this information is not to be found in our advertising pages. It is obviously to the interest of every manufacturer and dealer in building appliances to keep his materials and his name and address before the notice of the principal consumers. The advertising pages of this journal are undoubtedly the best medium for that purpose.

THE Toronto Builders' Exchange continues to make satisfactory progress. The brick manufacturers have recently connected themselves with the organization, and now constitute one of the sections of the Association, the total membership of which has reached about one hundred and fifty. The new rooms which are being fitted up at the corner of King and Victoria streets for the use of the Exchange, are expected to be ready for occupation in less than a fortnight. Preparations are being made for an enjoyable house warming to mark the removal of the Exchange to its new home.

THE Dominion Parliament has appropriated \$10,000 to the purpose of erecting a statue of the late Sir John A. Macdonald. It is said to be the intention to invite competitive designs from Canadian and European artists. A rare opportunity is thus afforded of displaying the worth of native talent. Care should be taken to make the most of it. The result of the efforts put forth by Canadian artists in this competition will have a distinct effect upon the future progress of art in this country. Much will also depend upon the wisdom which the government may display in the selection of competent and impartial persons to judge the designs.

THE *Building Register*, of Washington, makes the suggestion that in office buildings hereafter constructed, provision should be made for the storing of bicycles. It is pointed out that at present persons using these machines must leave them outside, where they obstruct travel or are exposed to thieves, or place them in corridors and halls, where they are equally out of place. The number of users of bicycles is very large, and they are such an indispensable means of locomotion in many branches of business that the number is rapidly increasing. If the increase is as great in proportion in the future as it has been in the past the law-makers will be obliged to take in hand the matter of keeping them off the street.

A DEPUTATION waited on the Minister of Customs and Public Works a few days ago to ask for an increased duty on Portland cement; also that the standard of this material be made as low as is compatible with public safety and that preference be given on all public works to cement manufactured in Canada. Considering that hardly any two persons conducting a test will attain to the same results with a given brand of cement, it seems to be a matter of little importance whether the standard

be a high or low one. Theoretically, however, it would seem to be proper that the government standard should be fixed reasonably high.

THE important position of City Engineer, Toronto, which has been allowed to remain vacant for a year, has finally been filled by the appointment of Mr. E. H. Keating. Mr. Keating was formerly City Engineer of Halifax, and occupies at present a similar position at Duluth, Minn. His reputation would indicate his fitness for his new position. The successful administration of this most important department of the city service will certainly afford scope for ability of the highest order. The amount connected with the appointment as salary was placed at \$4,000, but Mr. Keating asks \$5,000. The sum is not too great for a first-class man, but the mayor's right to assure Mr. Keating that the extra \$1,000 a year would be given him, without having laid the matter before the Council, is open to question.

THE district immediately north of Bloor street has within the last four or five years come to be regarded as one of the most desirable for residence purposes in the city of Toronto. This is due in a measure to its favorable location in proximity to the Queen's Park, the colleges and university, as well as the excellent street car accommodation, but more particularly to the fact that building restrictions are imposed governing the sale of lands, making it impossible for a cheap class of houses to be erected. In view of the precautions thus taken it is very disappointing to find that the result sought to be attained has to a large extent been defeated by the unsatisfactory character, in point of design, of the buildings erected. Unfortunately, much of the land in this locality has fallen into the hands of the speculative builder, who, while obliged to comply with the restrictions as to cost, is under no compulsion to have his designing done by other than a third-class architect. As a result we see a vast amount of good material which might have been made to assume forms of beauty delighting the eye and refining to the taste of the onlooker, wrought into forms of ugliness. Out of the hundreds of houses erected in this beautiful locality within the last five years, the number that can be said to be satisfactory in design might easily be counted on one's fingers.

THE introduction of the trolley electric system for the propulsion of street cars in Toronto was strongly objected to because it would result in adding to the number of overhead wires. When the fact was demonstrated that the trolley was the only successful system which could be adopted, the objectors had no alternative other than to philosophically try to make the best of the situation. There is a strong probability that with the electric street railway will come an improvement in the present arrangement of overhead wires, by which to a large extent their unsightliness and danger will be removed. It is understood that the street railway, electric light and telegraph companies have expressed their willingness to occupy jointly two lines of poles planted on either side of all streets on which cars will run. It is proposed to erect iron poles of sufficient height and strength to carry all the necessary wires. The carrying out of this proposal would allow of the removal of thousands of the large poles carrying electric light and telegraph wires now disfiguring the streets. The advantages would be about equal to those of the underground system, and without the added cost to consumers of electric light which would be certain to follow the construction and maintenance of the conduit system. We hope to see the idea successfully carried out.

WE publish elsewhere a series of "suggestions" issued by the Council of the Royal Institute of British Architects, for the conduct of competitions. The proposal to have the expert appointed to judge the designs advise as to the limit of cost, is designed to place all competitors on an equal footing. It has been the practice in Great Britain to charge competitors ten dollars or so for a copy of the instructions, which sum was returned only in the case of those who furnished a *bona fide* design. As it sometimes happens that a perusal of the instructions is sufficient to cause the architect to decide to have nothing to do with the competition, and as he is not in a position without the instructions to decide whether or not the competition is one which he might desire to enter, the Institute suggests that architects should be entitled to

be refunded the sum thus paid, in cases in which they do not desire to compete and in which they return the instructions within the period of thirty days. We are not aware that in Canada competitors have ever been asked to pay for the information necessary to enable them to decide whether or not they should comply with the invitation to compete. It is manifestly unfair that they should. The *Building News*, in discussing the value of these suggestions, admits that they embody many needed reforms, but says: "The main difficulty remains, the difficulty of finding in each case a suitable professional assessor. This has always been in principle, the weak point of the system. A happy accident has so far kept it from being very obviously such, but in course of time its weakness can hardly fail to become conspicuous. It is this difficulty, more than any other, which needs for the future the earnest attention of architects and their representatives." The appointment of three assessors, instead of one, should it be possible to obtain them, would no doubt tend to insure an impartial and satisfactory decision.

IT is said to be the practice of architects in Montreal to include the electric wiring of buildings in the plumber's specification. To entrust this work to the plumber, who, probably in nine cases out of ten has never devoted an hour to the study of electricity, seems like deliberately preparing the way for future difficulty. In this connection we quote as follows from a paper on "Safe Wiring" read by Mr. A. B. Smith, Inspector for the Underwriters' Association, at the recent convention of the Canadian Electrical Association: "While in a few instances much trouble and annoyance is caused by unskilled electric men, who have an idea they possess more knowledge than can be carried by one single brain, still there is a source of trouble to electric light people and the underwriters which is most serious. What I refer to is, the ignorant and clumsy interference with good wiring by plumbers, steam and gas fitters and other pipe men, and our friend the ubiquitous bell hanger. These individuals, with supreme contempt of others' rights, or through ignorance, not realizing the danger of their practices, are constantly making mischief. Nine cases out of ten, where trouble is located in an otherwise perfect piece of work, these pirates are to blame. It is a common occurrence to find gas or water pipes resting upon electric wires, these pipes or other iron work, having been placed in position after the electrical work was completed. Furthermore, there is a certain class of men, especially gas fitters, who really have an idea that they do know something about electricity, and who believe that because wires are sometimes run in pipes, that it is their special vocation to do it. It is true in this as in other matters, that 'A little knowledge is a dangerous thing.' Unfortunately the public have no protection against these half-baked electricians, and it is against this class of work that the insurance companies have to fight their greatest battles. Serious loss has only been averted by constant and skillful supervision, and were it not so, the loss from this source would be vastly greater."

THE wisdom of the large expenditures of the Dominion Government in the construction of canals, as well as in the deepening of those canals sufficiently to admit of the passage of heavily laden vessels from the great inland lakes to the seaboard, is now becoming apparent. As a result of the advantages in the amount of cargo and saving in cost of transshipment offered by the Canadian route over the Erie canal, the exports of grain and flour of the city of New York are steadily decreasing, while those of Montreal are to a proportionate extent increasing. In consequence, the Americans are becoming alarmed, and in the House of Representatives it has been proposed to make an appropriation to cover the cost of a survey to determine the most desirable and practical route for a deep water canal wholly within the territory of the United States, from the great lakes to deep water in the Hudson river. In view of these circumstances, and of the fact that the volume of water transportation as compared with transportation by rail is shown by trade statistics to be on the increase, we are pleased to see the revival of the project to connect Lake Ontario with the Georgian Bay by means of a ship-railway. If this connection were made, either by ship-railway or canal, it would be the means of shortening the route from the grain producing districts of the north-

west to the seaboard by some four hundred miles, and would give Canada an advantage which it would be impossible for her to be deprived of. It would be the means of building up the interests of Toronto and Montreal, of developing our shipping and of promoting trade between this country and Great Britain. The cost of a ship-railway is placed at \$12,000,000 to \$15,000,000. The cost of the proposed American canal is estimated at \$110,000,000. If, as is supposed, the saving in cost of transportation in deep draught ships from the lakes to the ocean, would in a single year amount to sufficient to pay this latter sum, there would not appear to be much risk involved in the Canadian enterprise at so much less cost, and in view of its greater advantages. The benefits to be derived from carrying out the undertaking, will depend to some extent upon its early commencement and speedy completion, in order that the volume of trade which, as stated, has already begun to flow in this direction, may be encouraged, instead of being allowed to be diverted into other channels.

SCIENTIFIC NOTES.

THE MONIER SYSTEM OF BUILDING CONSTRUCTION.

BY LEWIS ANGELL.

At the meeting of the Science Standing Committee, 4th inst., I called attention to the Monier system of building construction which I have recently had the opportunity of inspecting in actual operation in Berlin. The system consists of a combination of cement or fine concrete with a net-work of wrought-iron wire or small bars forming a core. The system is applicable to a great variety of forms—viz., floors, ceilings, roofs, domes, walls, bridges, retaining walls, waterpipes, circular or oviform sewers, &c., and even the fortifications. Its recommendations are great strength, and economy in materials, space, and time. It is especially fire and damp-proof, and, to a large extent, independent of skilled labor.

The accompanying sketches will generally illustrate the system, which, as above stated, can be applied to various forms of construction.

Fig. 1 is an illustration of a fire-proof floor or arch about 10 feet span and $1\frac{3}{4}$ inch thick. Upon an ordinary centre of planks a layer of cement and sand, in the proportions of 1 to 3, is laid one half the intended thickness of the arch. Upon this

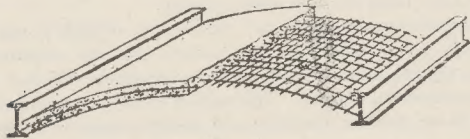


Fig. 1.

are laid longitudinally and transversely wrought-iron wires about $\frac{1}{4}$ inch diameter, so as to form a net-work with about 3-inch interspaces or mesh, the intersections being secured with fine wire. The net-work is then covered with another equal layer of cement, completing the thickness of the arch, the wrought wire net-work being thus embedded in the cement as a core. The spandrels are filled in with concrete in the proportion of 1 to 8. The thickness of the wire and the cement arch varies with the span and weight to be carried. The Hungarian Government tested a Monier arch, 2 inches thick, of 8 feet span, and 6 inches rise, by a distributed load of 31 tons with safety. Another arch 4 inches thick of 30 feet span carried a distributed load of 42 tons. A bridge has been constructed over the canal at Bremen with a span of 125 feet and 7 feet rise, having a thickness of only $7\frac{1}{2}$ inches on the crown.

It has been proved by tests and experience that the expansion and contraction of the cement and iron are equal, that cement and iron possess great affinities and become a solid mass, and

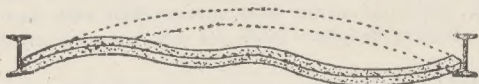


Fig. 2.

that the iron is not oxidized or otherwise affected independently of the cement. This form of construction give a maximum of strength with a minimum of material. It has also been proved by tests of the Hungarian Government that arches constructed on the Monier system will bear five times more weight than a corresponding best concrete arch, and that Monier slabs or

landings will bear twelve times more weight than corresponding slabs of concrete. Another valuable quality of the Monier construction is that it will not suddenly break, crash, or collapse as in ordinary construction, but it gradually buckles or sags, retaining the weight above (fig. 2). The chief of the Berlin Fire Brigade has issued an official order that firemen are to enter buildings constructed on the Monier system, as there is no risk of floors and ceilings cracking and falling by reason of either heat or water.

The system has made great way in Germany, Austria, Hungary, and other parts of the continent during the last three years in connection with public buildings, palaces, warehouses, bridges, waterworks, tunnels, drainage, &c.

The foregoing is only a general description of the wonderful results on the continent of this new system invented by Mr. Monier and elaborated by Mr. Wayss, the eminent engineer-architect of Berlin; and capable of such wide application. Its conception in a modified form is not altogether new. There have been proposals to introduce a wire-wove core in various forms, but there has not hitherto been any serious application of the principle to actual construction, nor does there yet appear to be any instance of its adoption in this country. Its first intended application is to be in the deck of the new pier about to be constructed at Brighton, in the form of horizontal slabs or paving, whereby a considerable amount of time and the space it would occupy will be saved. The system is well worthy of the serious consideration of British engineers and architects.

ILLUSTRATIONS.

PHOTOGRAVURE PLATE—PROPOSED NEW UNION STATION, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

The main building facing on Front street will be built of red Credit Valley stone for the two lower stories, and pressed brick with red Credit Valley stone dressing for the stories above, the roof being covered with red tile. The main entrance will be built of cut stone, floored in tile and leading into the main hall or rotunda, 40 x 50 ft., finished in oak, with tiled floors, the ceiling being panelled and enriched and the walls arcaded with stone and marble columns. The entrance to the company's offices will be by the tower entrance, which will contain an iron staircase and passenger elevators. Passing through the rotunda where tickets are purchased and baggage checked, the arcade corridor 20 ft. wide leads to the main waiting room. On either side of the corridor the store will be handsomely fitted up in most modern style.

The general waiting room 75 x 80 ft. will be finished in pressed brick and cut stone, with heavy enriched and panelled oak ceiling, with colored glass dome sky-light, light being also obtained from clerestory windows on three sides. The floors of this room and other waiting rooms will be laid with mosaic flooring. The ladies' and gentlemen's waiting rooms will be fitted up in hardwood, with decorated plaster ceilings, and the lavatories in connection with both of these rooms will be fitted up in the very latest and most complete style. Conveniently situated off the main waiting room will be the telegraph and parcel offices and news stand, with their respective fittings specially designed for their various uses. The outer or bridge waiting room will be finished in ash or other hardwood, with plate glass windows and doors. Two passenger elevators each capable of holding 40 persons will connect this room with track level, and also a handsome staircase ten feet wide finished in hardwood.

The new south train shed will be entirely of iron and glass and conform to the latest improvement in train shed construction.

The lighting throughout, and all power for elevators and other machinery, will be by electricity supplied from plant in the basement of main building. Heating throughout will be by steam.

The expenditure for the entire building will approximate \$500,000.

POWER HOUSE, HAMILTON ELECTRIC STREET RAILWAY COMPANY, HAMILTON—JAMES BALFOUR, ARCHITECT, HAMILTON.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A TOWN COTTAGE—DESIGN SUBMITTED BY "VERISOPHT."



DESIGNING A HOUSE.

A writer in the *Magazine of Art* says: In the actual process of designing a house, the plan cannot be separated from the elevation and sections; the architect's mind keeps playing backward and forward from the one to the other, so that the building grows up in his mind as an organic whole. To put it in other terms, while he is at work on the plan he is constantly considering the effect of his plan on his elevation, and vice versa. The results of the work are duly displayed in plan, elevation and erection; and this, no doubt, leads to the false impression in the lay mind that the plan and elevation can be considered apart, and are not in necessary relation to each other. As the plan is embodied in the elevation and sections—that is, in the actual walls of the building—the two must be considered together in practice. With this provision, there are one or two matters which more particularly concern the plan. The main points to aim at are simplicity and compactness of arrangement and plenty of light. A long, crooked passage, with constant changes of level, may be very romantic and admirably adapted to the habits of the "Decameron," but with the hurry of the modern household and the unadroitness of the domestic servant, it means cold dishes and disaster with crockery, and general discomforts and ill-temper. There has been a tendency lately to overdo the queer corner and the curious passages. I have a book before me, sent out by a well-known firm of furnishers, in which there are half a dozen or more designs for inglenooks and bays and recesses which do not result from any necessity of the plan, but are placed at random with no particular object but that of looking queer. The real old ingle is quite delightful, with its great cambered oak-beam across the opening, 14 feet wide or more, and its red-brick floors and the old muzzle loader over the chimneypiece, and the little lead-glazed lattice with its dimity curtain; but how far away from this is the affectation of a modern ingle-nook, with its aggressive grate and mechanically stamped paper frieze and frillings of "art fabrics." If you are going to have an inglenook, at least keep it plain and solid and comfortable, and have a hearth before which you can stretch your legs, and a fire place big enough to burn a reasonable, good oak log. So, too, with the passages; let them be wide enough for two people to pass, and light enough to prevent their falling into each other's arms. In country houses the position of the sitting room is usually determined by the aspect, and in a house of any pretension there is sure to be a good-sized hall and ample stair case; but the hall is worth a sacrifice, even in smaller houses. The first impression you form of a house is very often the last, and your first impression is formed in the hall.

It is not in the least necessary that it should be two stories high. Some of the most charming little halls in seventeenth century and modern work are long, low rooms, sweet and homely to live in, places never haunted by the ennui of magnificent dreariness. For moderate house the one-story is rather an advantage because it practically gives another sitting room, and in quite small country houses, such as those that are used, say, for summer holidays, why not return to the plan of the yeoman's house of the sixteenth century and earlier, when one great hall was the general living room, and at one end were the kitchen and offices and the servants' rooms, and at the other the solar and the rooms of the master and his family? A house costing less than \$5000 could have room enough for a billiard table or a dance, such as would be quite impossible in the stuffy, respectable house up the village built by the squire when he came of age. The reason for such a room would not be mere picturesqueness, but its manifold uses, its essential reasonableness, and the same reasonableness would not be afraid of the plainest work; of showing the rafters or the ceiling joists, or of lining the back of the fire place with honest red brick.

TO PUT ON HARDWARE.

BY OWEN B. MAGINNIS.

ALL working parts of joinery have moveable fixtures to secure them to those parts which are fastened or permanent. So fixings, or as they are better known "hardware," are manufactured for this purpose. By "hardware" is meant the iron and brass hinges, locks, etc., which are placed on doors, windows, and such like, and the purpose of what follows is to show the carpenter how to put it on properly.

Should the doors be of various heights, take two standard distances, say nine from the bottom and six from the top, or if desired, place the hinge just below the bottom edge of the top rail, and above the top edge of the bottom rail. Mark the two ends of the hinge with the point of a penknife, then set a guage to suit the width which will be necessary to let the hinge into the door-edge, which width will be regulated by the width of the hinge itself and the thickness of the door, in order that the screws which are to hold the hinge may be turned solidly into the wood and still leave a $\frac{3}{8}$ or $\frac{1}{4}$ margin. A second guage will require to be set to the thickness of the hinge, allowing a little margin, that when it is let into the beveled edge of the door, it will come about square to the face. It must not, however, be so much sunk as to cause it to hingebound when hung. When the sinkage is made in the edge, the hinge can be inserted, and if it be a loose jointed or loose pin hinge, one piece may be set in and the pin side kept up. Should the hinge be a cast iron or japanned one, the end of the handle of the hammer might be used to knock it into place, but if it be of lacquered, bronzed or buffed brass finish, a neat clean block of soft white pine must be brought into use to avoid injuring the polished surface.

The hinge should not be made to fit too tight, as it may be found necessary to take it out again, and if it fit too closely there is a liability of spawling the corners in doing so.

Brass screws must always be driven with a firm, square edged screw driver and care must be taken, that the point does not jump out of the slotted head of the screw, so as to mark and scratch the head.

In hardwood finish, brass screws should be well bored for with a German bit, and they should be slightly greased with a little soap or beeswax before being placed in the hole.

It is scarcely wise to hammer brass very much as brass is a soft metal, and the screw is liable to bend under the stroke of the hammer.

When the hinges are screwed on the door edge, place the door in the frame in the rebate, and wedging it up from the bottom so that the top edge will be an easy point, mark the positions of the hinge sinkages, (with a pocket knife) and cut out the wood as before, avoiding sinking it too deep, lest it should be found necessary to block out the hinge again with shaving or paper. It is better to pare out a little than do this, but care must be taken that it is not what carpenters call "hinge bound" which means that the hinges are sunk in too much, and the hinged joint is too close.

The only way to become an expert door-hanger is by practice, and care should be exercised while learning in order to put the hinges on without injuring them and make the door work properly.

Single and double action hinges are much more difficult to put on than ordinary single action butts, still the makers give the carpenters great assistance by sending printed directions with sketches in each box showing the lock in position and in parts. This enables him to comprehend the way they should be set, and the directions and sketches ought to be thoroughly studied and understood before making a mark or using a tool. On no account should metal hinges be struck with a hammer as they are liable to fracture. Those of brass will stand a blow, but usually show the effect in bruise or dent.

Ordinary brass-faced mortise locks need nice fitting and require to be set in flush with the door's edge, and not project if the edge is beveled. Brass door-knobs and escutcheons ought, in all cases, to be covered with linen, to prevent rough, sandy hands from scoring their polished surface. Tie the keys to the knobs, or, if this be risky, put a marked and numbered tag on each, in order that its lock may be readily found.

Patent door springs have printed directions, which must be adhered to to insure satisfactory working. Yale and other special locks need special cutting, and, therefore, a good machanic to put them on right; but the sketch in the box is a wonderful aid to novices. These locks ought never to be taken apart, on account of their intricacy. An error of this kind once cost the writer much expense and delay and a good wetting bringing it to the manufacturer's depot for readjustment.

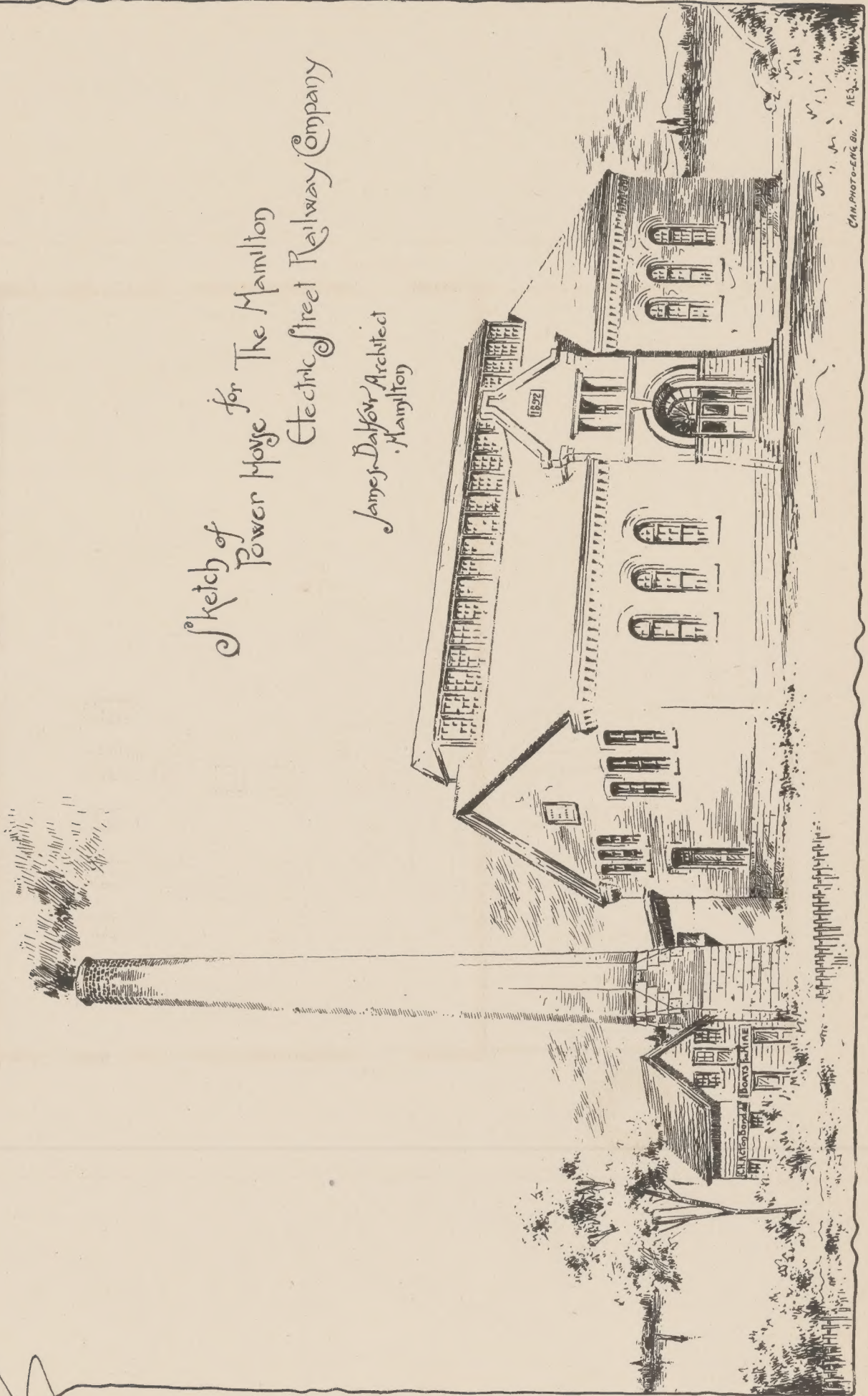
In regard to sash locks there is little to be said, except that they require to be put on so as to really lock the window—namely, bind it close together at the meeting-rails, besides preventing the sash from being moved. Fasten on escutcheons perfectly plumb and drawer-pulls level, and the slots of the screws in a line with the work. For instance, in escutcheons, finger-plates, hinges and lock-faces all the slots should be kept plumb, and no drawer-pulls, door-pulls, or any brass, iron or silver work, kept level or horizontal. English ship-joiners never put their screws in any other way but this.

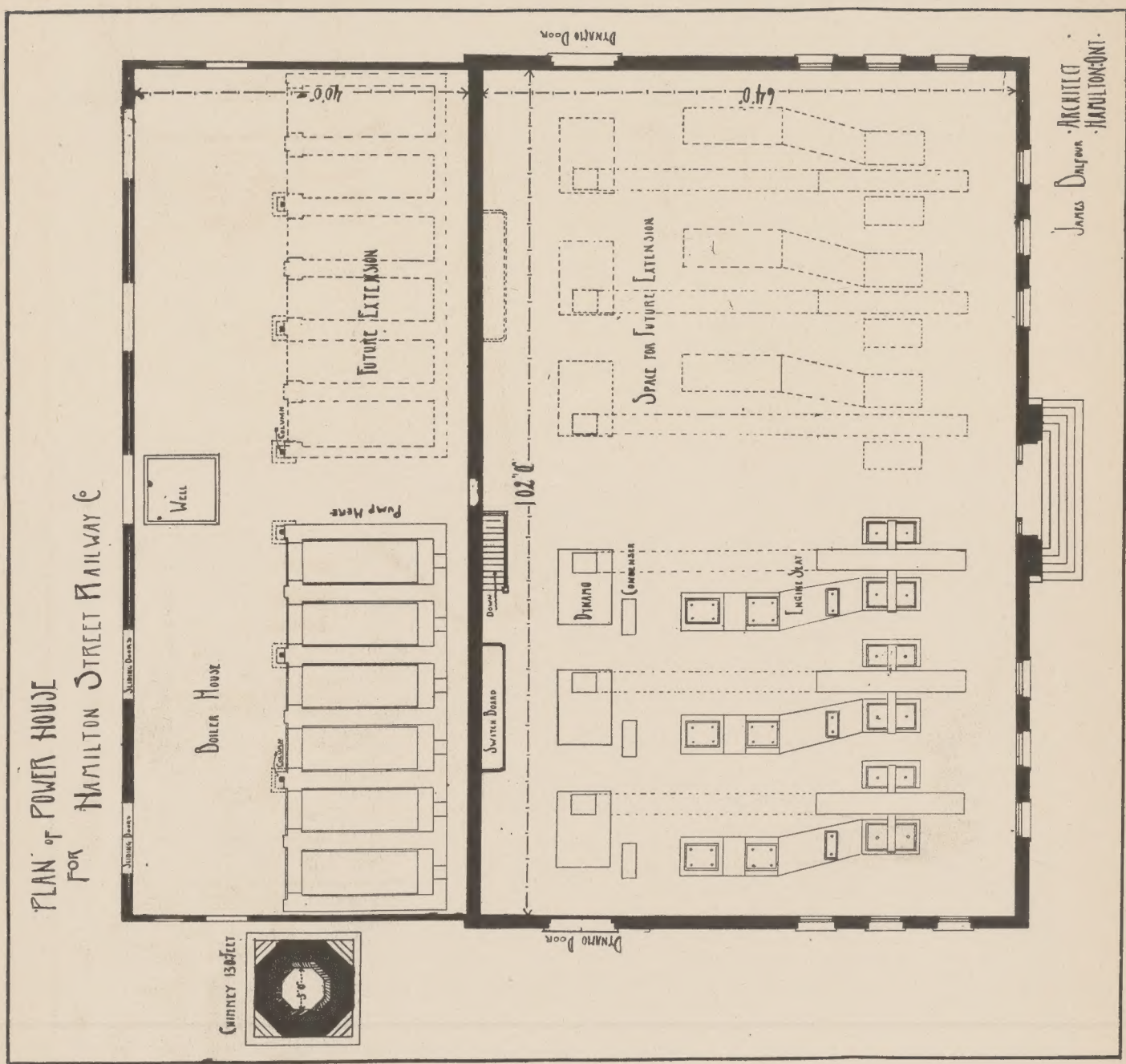
The hardware of sliding-doors run on a track on the floor consists of the sheaves, or rollers, the track on which they run, the lock and fittings and the iron door-stop above.

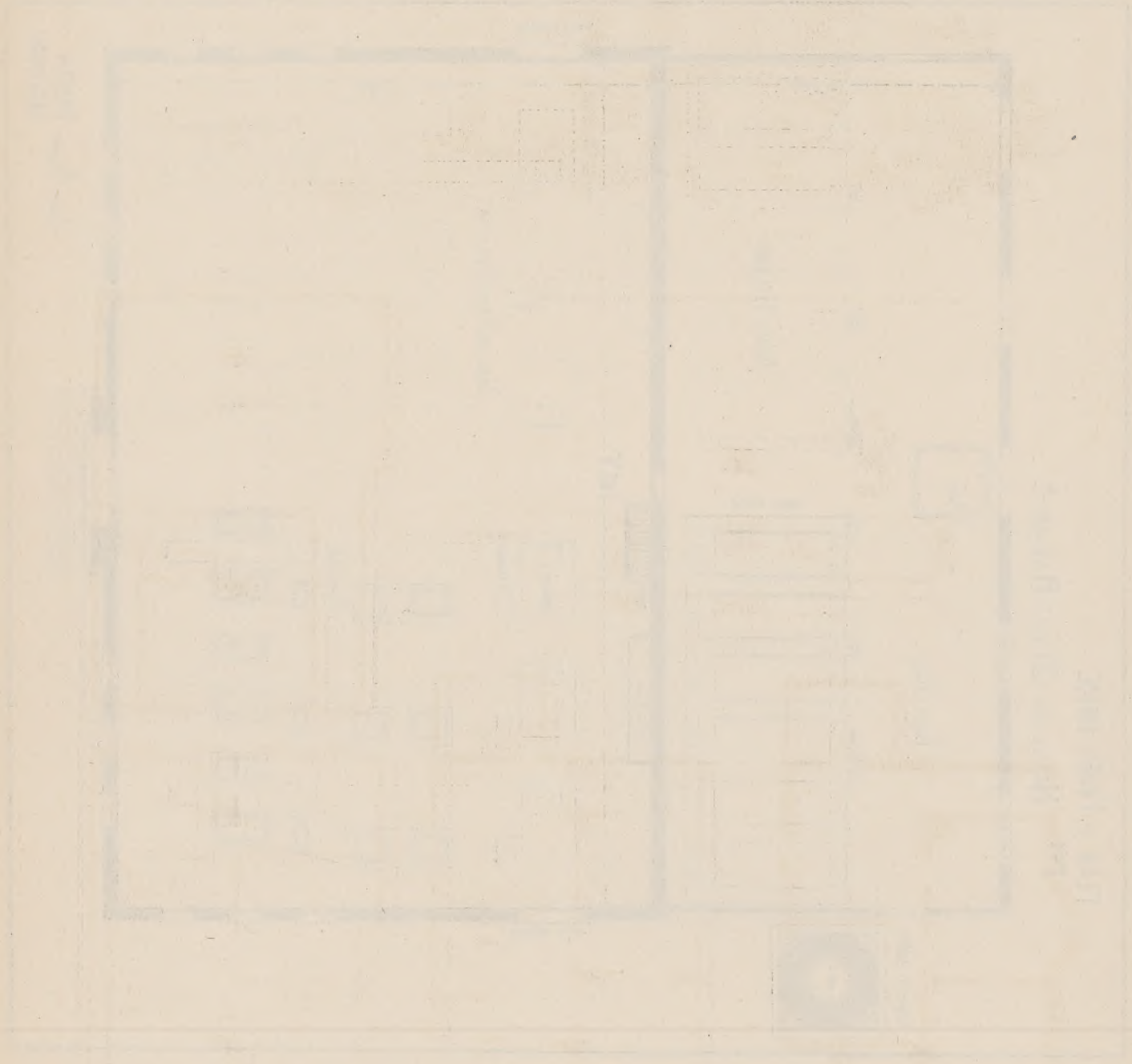
In fitting in the sheaves, the main thing is to get them in the centre of the edge, to bring the two doors fair and to have them project equally. The doors ought, of course, to be fitted till the joint comes, and when the inside wood stop is mortised in and cut the two can be set on the track—which, by the way, comes in two lengths—and the sheaves regulated till the doors close tightly. Enough should be allowed from the floor for carpet

Sketch of
Power House for The Hamilton
Electric Street Railway Company

James Duffour Architect
Hamilton







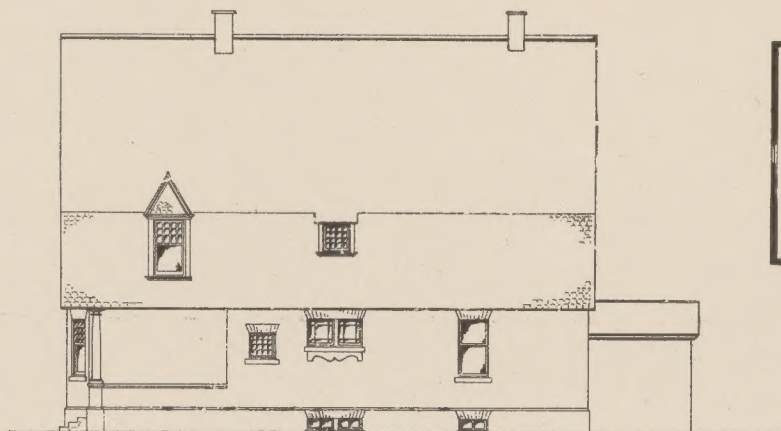


—Perspective—

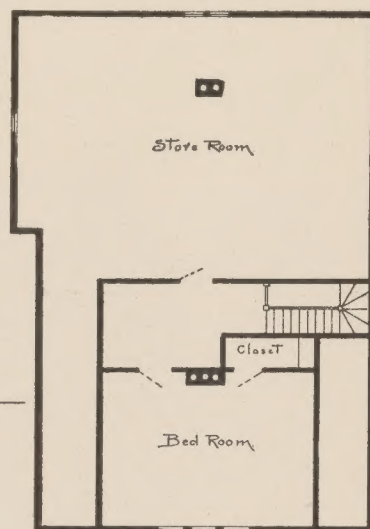
CANADIAN ARCHITECT.
COMPETITION
for a
TOWN COTTAGE.

Design Submitted
by

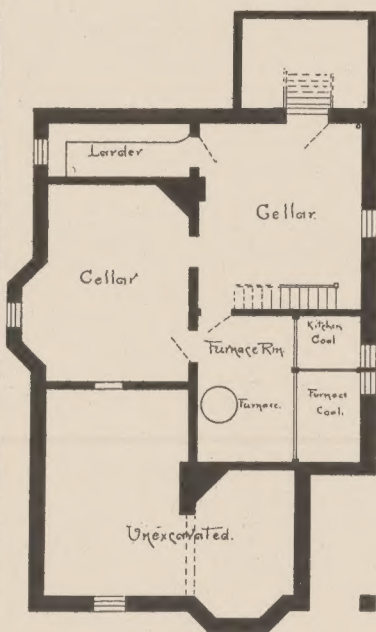
Verisophy.
Scale.



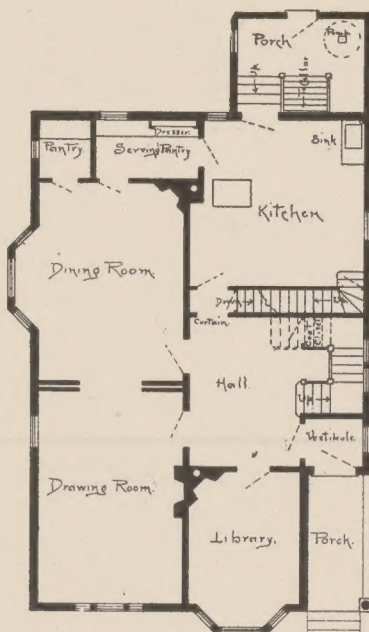
—North Elevation—



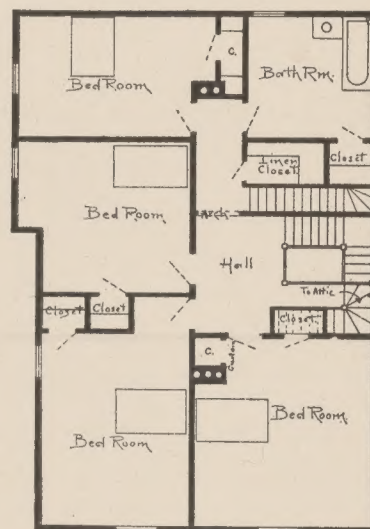
—Attic—



—Basement—



—Ground Floor—



—First Floor—

saddle. The stop is let flush into the door-head and the lock put on in the usual way. No hardwood sliding-doors should ever be made without friction-strips, to save the arrises and faces of the door's surface.

Sliding doors hung from above with sliding door hanger demand an entirely different treatment. The track being of wood and screwed on the partitions necessitates their being put on before the second partition forming the door pocket is put up. It is best to line pockets, for these doors, with matched ceiling to keep the door from being scratched. Concerning the fitting and adjustment of the hangers I would say there are many very excellent makes on the market and each has its own special features and special directions which are sufficiently clear and explanatory for any one of ordinary intelligence to work from.

Fanlight levers, bolts, etc., are comparatively simple in their application and demand little or no direction, but the great thing to watch in putting on all hardware is to make it fit neatly, so that it may look well. All marking, therefore, should be exact to insure the piece fitting in its place and working freely, without sticking.

HOW TO ESTIMATE.

By W. H. HODSON.

Following is the balance of specification and bill of quantities accompanying the drawings of Baptist Church, Walmer Road, Toronto, published in the CANADIAN ARCHITECT AND BUILDER for May:

PLUMBER AND GAS FITTER.

State reduction if gas piping be entirely omitted. Lay on from meter in basement best $1\frac{1}{2}$ in. tested iron piping to ceiling of auditorium and carry from thence to points marked on plans, commencing with $1\frac{1}{4}$ in. and diminishing to $\frac{1}{2}$ in. as required. Provide for three separate supplies, one to basement, porch and vestry building, one to the rest of ground floor, and one to the gallery, and place taps in places convenient of access in rear passage; all to be of best tested iron piping laid complete and made ready for fixtures with all necessary bends, junctions, &c., complete, and to be satisfactorily tested on completion. All drop lights to be taken out of side of supplies and in no case from the bottom—thoroughly secure to joists or timbers. Lay on water from line of street with $\frac{3}{4}$ in. lead pipe of 8 lbs. lead to line of fixtures, and from thence $\frac{1}{2}$ in. 6 lbs. to sink, baptistry, W. C's. and basins. Provide brass stop and waste cock immediately inside wall, and pipes to be graded to this point. Provide and set a double tube street washer hydrant where marked. Fit up in basement a cast iron sink 18 ft. long with $1\frac{1}{2}$ in. waste pipe of lead, Dubois trap and trap screw, brass fuller cock. The two water closets to be Malcolm's No. 1 toilet, fitted up with cabinet work and double hinged hardware seats and having all necessary cranks, valves, &c., complete. There will be a 4 in. cast iron extra heavy soil pipe carried from W. C's. to drain. Extend the soil pipes a single pipe up to and 3 ft. above roof with proper open tops to the same. Soil pipe to be coated on both sides with coal tar applied hot, and joints to be carefully caulked with oakum and lead. Provide two brass cleaning screws where directed. Basins to be 12 in. diameter with $1\frac{1}{4}$ in. counter sunk marble tops and backs 9 in. high, $1\frac{1}{2}$ in. lead waste, Dubois trap, plated plug and chain and plated self closing Hyde cocks. Line baptistry, which will be open, with 14 oz. tinned and planished copper in best manner and provide 2 in. heavy lead waste and overflow properly trapped and carried into drain—plated rose plug and chain. Move and connect present double jacket heater now in school building with 1 in. heavy lead circulating pipes to and from baptistry. Provide brass cock for emptying boiler with waste to baptistry waste. Provide galvanized iron smoke pipe and damper connected into chimney. Put 3 in. lead ventilators to traps of W. C's carried into soil pipe above fixtures and receiving 2 in. and $1\frac{1}{2}$ in. branches from traps of the other fixtures. All piping and materials to be of weights and description conforming to city by-laws.

PLASTERER.

All brick walls will be finished to show bricks, except in vestry and dressing room building. Plasterers will be required to exercise the most extreme care in order to preserve the pressed brick work from damage in any form. Supply the necessary cotton sheeting to prevent them being splashed with mortar. The inner face of outer brick walls of vestry building to be well parged, making tight and close at frames, etc. Lath with the best sawn pine laths the whole of the ceilings, partitions, soffits of gallery, battered walls in vestry building and other places, prepared for lathing; laths to be not more than 1 in. wide for ceilings and $1\frac{1}{4}$ in. for walls, $5/16$ in. apart, well nailed, ends butted, and joints broken every 12th lath. The partitions and ceilings and soffits of gallery and other places prepared for lathing, to be plastered in best three coat work, sand finish. All the corners will be of wood. Walls to be rendered behind all skirtings and sheetings. The mouldings of capitals of the 16 large columns (ground floor and gallery) to be in plaster freely executed. The foliated capitals of the 8 columns in gallery to be in plaster modelled in most artistic manner by modeller to be chosen by the architects. The whole of the work to be of the best quality of materials and workmanship, the mortar to be prepared with clean sharp sand, lime and hair in proper proportions, and the work to be left free from cracks, stains, blisters, or other blemishes, and sound and perfect on completion after making good after other trades. Plasterer to leave all dressed woodwork clean and ready for painter. Remove all rubbish and broom clean floors throughout on completion.

PAINTER AND GLAZIER.

A separate tender is required for the lead glazing. Windows of basement to be glazed with — sheet glass; windows of vestry and dressing rooms to be glazed with 16 oz. glass, the lower panes to be ground. Glass to be well puttied and back puttied, sashes to be primed before glazing. The iron columns to be painted three coats and picked out in bronze. Iron work of principals to be painted three coats of blue and bolt heads gilt. The whole of the external woodwork usually painted, including window and door frames, eaves, &c., to be painted in three coats of best white lead and linseed oil paint of approved tints. Eaves, gutters and down pipes to be painted two coats. The whole of the internal wood work, unless otherwise described, including doors, casings, roof timbers, skirtings, sheetings, &c., &c., to be cleaned, stained to such tints as may be directed and twice varnished with best copal varnish. The risers of gallery plates to receive one coat of stain in oil. Inside frames of windows to be painted three coats. The pulpit front, tracery over baptistry, doors of church and vestibules, vestibule screen, the strings, rails and balusters of staircase, and the gallery front will be of hardwood, to receive a thorough coat of oil, to be well filled with approved fillers, to receive two coats hard oil and rubbed down with pumice stone and sweet oil. Painter to clean sash windows and scrub floors before and after painting and leave glass perfect

on completion. The ceilings of church and vestibule, tower and staircase, the walls in church when plastering, and the walls of ceilings of vestry to be calcimined in two coats of tints to be chosen.

LEAD GLAZING.

All the windows except basement and windows of vestry and dressing rooms (which are in painter's specification) will be glazed with leaded glass, also traceried heads of entrance doors and six sets of swing doors; all to be set in strong church lead, securely soldered and cemented and secured with strong copper wire to $\frac{1}{2}$ round iron bars, properly japanned. Lead work to be bedded in frames in thin putty and stops to be closely nailed up to lead. Provide and fix as shown in elevations carefully fitted steel frame ventilators. The windows in loft to be glazed with clear glass in simple quarries. The windows of porch and rear vestibule and third stage of tower to be glazed with rolled cathedral glass of approved tints and in small quarries. The other leaded windows, traceried fanlights and vestibule doors and screen, to be glazed with muffled cathedral glass of delicate tints in varying geometrical forms, with roundels and other features to be chosen by the architect. The six sets of swing doors will be glazed with clear glass set in lead made to geometrical forms with occasional roundels.

BILL OF QUANTITIES.

PLUMBER AND GASFITTER.

176 lineal ft. of $\frac{3}{4}$ in. lead water pipe, 8 lbs. to the yard	-	\$	c.
400 lineal ft. of $\frac{1}{2}$ in. lead water pipe, 6 lbs. to the yard	-		
35 lineal ft. of $1\frac{1}{2}$ in. lead waste pipe	-		
18 lineal ft. of 2 in. heavy lead waste pipe trapped	-		
230 lineal ft. of $1\frac{1}{2}$ in. iron gas piping	-		
360 lineal ft. of $1\frac{1}{2}$ in. iron gas piping	-		
556 lineal ft. of $\frac{1}{2}$ in. iron gas piping	-		
140 lineal ft. of 4 in. soil pipe (heavy) open traps, caulked with oakum and lead, coated with coal tar	-		
1 brass stop and waste cock	-		
1 double tube street washer hydrant	-		
1 cast iron sink 18 ft. long	-		
1 Dubois trap and screw	-		
1 brass fuller cock	-		
2 Malcolm's No. 1 toilet water closets hinged, hardware seat, cranks, valves, etc., complete	-		
2 brass cleaning screws to soil pipe	-		
2 12 in. dia. basins, $1\frac{1}{4}$ in. counter sunk marble tops, backs, etc.	-		
2 Dubois plated plug and chain	-		
2 plated self closing Hyde cocks	-		
1 plated rose plug and chain	-		
1 brass cock emptying boilers with waste to baptistry waste	-		
1 galvanized iron smoke pipe and damper to chimney.	-		
3 lead ventilating pipes connected to soil pipe with branches from traps	-		
1 rear basement water closet, etc., complete in working order	-		
Lining baptistry with 14 oz. copper	-		
Move and connect present heater with inch pipes to and from baptistry	-		
Traps, bends, junctions, holdfast, etc., to gas pipes, joints leaded, left ready for fixtures	-		
State deduction if gas piping be entirely omitted	-		

PLASTERING.

2207 $\frac{1}{2}$ supl. yards of 3 coats work	-		
188 $\frac{3}{4}$ supl. yards of 1 coat and rendering	-		
16 plaster copetals, moulded, etc.	-		
8 foliated copetals, gallery	-		
Supply cotton sheeting to prevent damage by splashing	-		
Parge inner face of walls as specified, tight and close to frames	-		
Leave wood work clean for painter, remove rubbish, clean floor, etc., on completion.	-		

PAINTING AND GLAZING.

654 supl. yards of 3 coats painting	-	\$	c.
1655 supl. yards of staining and 2 coats varnishing	-		
70 supl. yards of 3 coats, picked in bronze	-		
13 supl. yards of 3 coats, blue, bolt heads in gilt	-		
28 supl. yards of 1 coat stain in oil	-		
175 $\frac{1}{2}$ supl. yards of 1 coat, oil filled, 2 coats, rubbed down, etc.	-		
213 supl. yards of 2 coats, painting eaves, gutters, etc.	-		
2763 supl. yards of calcimining in 2 tints	-		
600 supl. yards of sheet glazing	-		
Glazing vestry and drawing-room windows with 16 oz. glass, lower panes ground	-		
553 supl. yards of lead glazing, soldered and cemented, etc.	-		
75 supl. yards of clear lead glazing	-		
172 supl. yards clear glazing loft windows	-		
203 supl. yards of rolled cathedral glazing	-		
100 supl. yards of muffled cathedral glazing	-		
Providing steel frame ventilators as per elevation carefully fitted	-		

CANADIAN BUILDING STONES.

PETERBORO, ONT., June 7th, 1892.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—Can you inform me as to the address of the proprietors of the Credit Valley stone quarries? I should think that it would be well for them to advertise in your paper.

Some time ago you promised us a report of a test to be conducted at the School of Practical Science of the different kinds of building stone. I have not yet seen the report, but would like to, as I am desirous of getting information as to where the different kinds of stone could be obtained.

I remain, yours respectfully,

F. BARTLETT.

A new system of builders' scaffolds is said to have been invented by a Duluth, Minn., man, who claims that his device will save at least 30 per cent. of the cost of laying brick wall by the use of the present system of lumber scaffolding. The new scaffold is made of aluminum and steel, is light, strong and durable, and is moved upward by a set of simple levers as the wall progresses upward, always keeping the bricklayer's material directly in front of him.

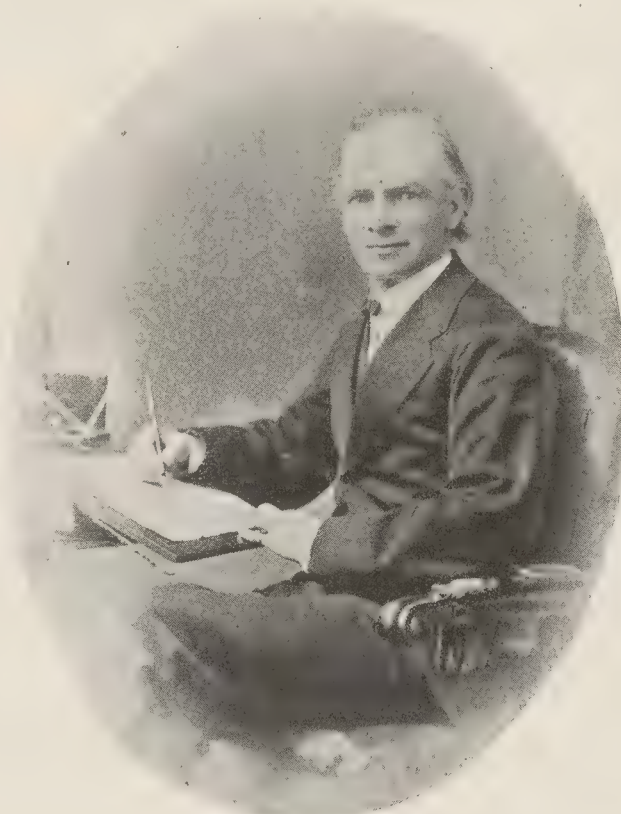
THE LATE W. T. THOMAS.

MR. W. T. Thomas, the well known architect, who died at his late residence, 119 Mackay Street, Montreal, on the 26th ult., was the son of the late Wm. Thomas, architect, of Toronto, who came to this country in 1844, settled in Toronto and was one of the leading architects in the west, and a pioneer of Gothic architecture in Canada, and even on this Continent. His brother, the late John Thomas, won wide distinction as a sculptor and architect, having been chosen by Sir Charles Barry, the architect of the Houses of Parliament at Winchester, to execute the statuary about that building.

The subject of this sketch inherited the family ability, and studied under his father the profession of which he proved himself a master. Mr. Thomas went to Montreal about the year 1864, and for a short time practised in partnership with his brother, Mr. C. P. Thomas, now of Chicago, and subsequently in his own name, rising at once to the first rank among his confreres.

St. George's Church in Montreal, and Trinity Church, St. John, N. B., (both won in open competition), are perhaps the best examples of his genius in Church building, but the many churches which he designed elsewhere, also bear evidence of his ability. Mr. Thomas did not, however confine himself entirely to ecclesiastical architecture, as he executed among other buildings in Montreal, the Caverhill block on St. Peter Street, and the houses of the late Thomas Workman, Lord Mount Stephen and Mr. Duncan McIntyre, the Prescott Town Hall and other buildings throughout the country.

The deceased gentleman leaves a widow, the daughter of the late John Hancock, barrister, of Montreal, and two sons who are studying their father's profession. His funeral took place on the 28th ult. the pall bearers being chosen from the members of the profession in Montreal, viz: J. A. Hopkins, R. C. A.; A. G. Fowler; A. F. Dunlop, R. C. A.; J. J. Brown; James. Wright; W. McLea Walbank.



THE LATE W. T. THOMAS, ARCHITECT, MONTREAL.

SUGGESTIONS FOR THE CONDUCT OF ARCHITECTURAL COMPETITIONS.

SANCTIONED BY THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

1. The promoters of an intended competition should, as their first step, appoint one or more professional assessors, architects of established reputation, whose appointment should be published in the original advertisements and instructions, and whose decision should govern the selection of the designs.

All designs sent in should be submitted to the assessors.

2. The duty of assessors should be :

(a) To draw up the particulars and conditions as instructions to competitors, and to advise upon the question of cost.

(b) To determine which of the designs conform to the instructions, and to exclude all others.

(c) To advise the promoters on the relative merits of the designs admitted to the competition, and to make a selection in accordance with the conditions.

3. Every promoter of a competition and every assessor engaged upon it should abstain absolutely from competing and from acting as architect for the proposed work.

4. The number and scale of the required drawings should be distinctly set forth, and they should not be more in number, or to a larger scale, than necessary to clearly explain the designs. If perspective views be required, it should be so stated, and they should be uniform in scale, number, mode of coloring, etc.

5. Competitions should be conducted in one of the following ways :

(A) By advertisement, inviting architects willing to compete for the intended work to send in designs. The promoters, with the advice of the assessor or assessors, should make their selection for such designs. The author of the design awarded the first place should be employed to carry out the work.

(B) By advertisement, inviting architects willing to compete for the intended work to send in their names by a given day, with such other information as the candidate may think likely to advance his claim to be admitted to the competition. From these names the promoters, with the advice of the assessor or assessors, should select : (a) an architect to carry out the work ; or (b) a limited number to compete, and each competitor thus selected should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work.

(C) By personal invitation to a limited number of selected architects to join in a competition for the intended work. Each competitor should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work.

6. No design shall bear any motto, device or distinguishing mark, but all designs should be numbered by the promoters in order of receipt. Any attempt to influence the decision of the promoters, or of the assessor or assessors, should disqualify a competitor.

7. In every case the amount of premium or remuneration for the competitive designs should be fixed by the promoters, acting under the advice of the assessor or assessors, and should be paid in addition to the usual professional charges for carrying out the work.

8. Where a deposit is required for supplying the instructions, it should be returned on the receipt of a *bona fide* design, or if the applicant declines to compete and returns the said instructions within a month after their receipt.

9. A design should be excluded from a competition :

(a) If sent in after the period named (accidents in transit excepted).

(b) If it does not substantially give the accommodation asked for.

(c) If it exceeds the limits of site, as shown on the plan issued by the promoters, the figured dimensions on which should be adhered to until officially altered.

(d) If the assessor or assessors should determine that its probable cost will exceed the outlay stated in the instructions, or the estimate of the competitor, should no outlay be stated ; provided always that, should the assessor or assessors not have been consulted in the first instance respecting the cost, as recommended in paragraph a of Clause 2, and should he or they be of opinion that the outlay stated in the instructions is inadequate for the proper execution of the proposed works, the assessor or assessors shall not be bound in the selection of a design by the amount named in such instructions, but the question of cost shall, nevertheless, be a material element in the consideration of the award.

(e) If any of the other instructions are violated.

10. It is desirable that all designs submitted in a competition, except any excluded under Clause 9, should, with the consent of their authors, be publicly exhibited after the award has been made, which award should be published at the time of exhibition.

11. The architect whose design may be selected as the best

should be employed to carry out the work, and he should be paid in accordance with the Schedule of Professional Practice and Charges of Architects sanctioned by the Royal Institute. If no instructions are given to him to proceed within twelve months from the date of the selection, he should receive adequate compensation in addition to the premium (if any) awarded to him. In the event of a part only of his original design being carried out, he should be paid a sum to be agreed upon in respect of the deferred portion, such sum to be merged in the usual professional charge when the completion of the design is proceeded with.

It should be understood that the Royal Institute issues these suggestions as a guide to promoters where a competition has been decided upon, but not as necessarily recommending the principle of competition.

ASTON WEBB, *Hon. Secretary.*
WILLIAM H. WHITE, *Secretary.*

The Royal Institute of British Architects,
9 Conduit Street, Hanover Square, London, W.
Re-issue after revision, 2nd June, 1892.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At the regular monthly meeting of the Council of the Province of Quebec Association of Architects held on the 11th inst., Mr. A. C. Hutchinson was appointed examiner in place of Mr W. T. Thomas, deceased.

The Secretary reported that he had several applications for examination to enter upon the study of architecture and one for final examination.

It was resolved that the Council of the Province of Quebec Association of Architects at this their first regular meeting since the demise of the late Mr. W. T. Thomas, take the opportunity to record their sense of the loss sustained by the profession in the decease of their late respected confrere, who during a practice extending over thirty years, designed so many important buildings that contributed so largely to the advancement of architecture. It was also resolved that a copy of this resolution be forwarded to the widow of the deceased, and that copies be sent to the CANADIAN ARCHITECT AND BUILDER and to the city press for publication.

It was also resolved that Mr. J. J. Brown be appointed a member of the Council to fill the vacancy caused by the resignation of Mr. C. Clift, the Secretary, and the acceptance of the same office by Mr. A. C. Hutchison.

PRESBYTERIAN CHURCH COMPETITION.

THE following is the report of the experts appointed to examine the designs submitted in the recent Presbyterian church competition :

TORONTO, May 31st, 1892.

W. A. LANGTON, ESQ., Registrar O. A. A.

DEAR SIR,—In compliance with your notification of May 6th of our appointment as experts, we have examined the competitive designs sent in for Presbyterian churches, and with much regret we beg to say that in our opinion there is not a sufficiently large number of suitable designs among them to warrant the committee in publishing a pamphlet.

The design for "a country church," under the motto "John Nox" is unquestionably the best of those submitted, that for "a village church," under the same motto coming next in merit, and to the author of these we have awarded the first prize.

Although there is considerable talent displayed in several of the sixteen sets received, there being some excellent suggestions in unfinished drawings, there are nevertheless none, with the exception of the two above mentioned, entirely fulfilling the requirements of the competition, which called for plans of peculiar treatment intended specially to meet the wants of Presbyterian congregations, at the same time having sufficient artistic merit to assist in raising the standard of church architecture in this country. This then being the object of the competition, neither those designs partaking largely of the character of existing buildings, nor those lacking study or of questionable architectural merit, can be said to have attained the end in view, and for that reason such have not been placed.

We respectfully suggest that the premiated designs be kept as a nucleus, and another attempt be made next winter to obtain an additional number of creditable plans.

Yours truly,

FRANK DARLING,
JOHN GEMMELL,
A. FRANK WICKSON, } Com. of Experts.

The members of the Toronto Architectural Sketch Club are engaged to-day in a cricket match with a local team at Norway.

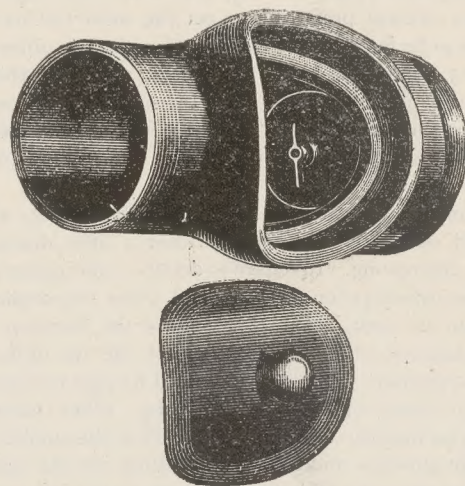


A VALUABLE PLUMBING DEVICE.

Editor CANADIAN ARCHITECT AND BUILDER.

While our plumbing by-law aims at and, perhaps, as nearly approaches sanitary perfection as that of any city, one want has been felt by those who desire to live up to it in the spirit as well as the letter.

When a soil pipe system, including iron drain, has been put in, tested and proved sound, there remains a joint, or rather two of them, and the most difficult of all to make, to connect with the tile drain just outside the building. Though most likely to be defective, there is no chance to test this work, either to see that the inside be clear of cement or the joints gas and water tight. When the tile drain is taken alongside the building to foot of soil pipe, the defects are doubled, and in many hundreds of cases has this been done under our by-law for the want of a simple appliance not in our market, though as a makeshift a T pipe has been used by some plumbers. During my recent travels I was pleased to find an invention, clearly shown by the accompany-



ing cut, known as an "access pipe," and commonly used in England. Having the maker's address, and the price being low, I do not see that we need be longer without it.

In this connection I might also state that in England the practice of laying tile drains corresponds with the national character, ponderous and immovable. A rest is provided under each joint and the whole drain is encased with a solid mass of concrete before covering with earth, preventing any settlement or breaking of joints. The ventilating of traps under fixtures, however, is not common, nor is the plumbing generally equal to ours, though we go to them for fixtures; and I shall be glad when under free or fair trade we may be able to use more of them, as for instance, Shank's porcelain lavatories, as cheap there as the bowl and marble slab, also their enamelled iron baths, more durable than sheet metal and cleaner than wood encased fixtures.

On the continent of Europe good plumbing seems to be unknown, and some of their interesting customs perhaps savor less of decency, according to our standards, than of utility and comfort. In the milder climates, conducive to out-door life, sanitation and house heating, so important with us, can safely be neglected and human energies find occupation in the many fields of art which in this new land remain as yet untilled.

M. B. AYLSWORTH.

VARIATIONS IN PRACTICE*

BY H. J. BARRON.

The writer had intended, when starting on this paper, to take some special subject, such as the dimensions of main pipes, or the proportions of risers, but as this is the first meeting at which papers are to be read he decided that glittering generalities might in his case be of more use than solid specialties. The saying that "variety is the spice of life" is not, as it often seems, a flippant remark, but is the most profound philosophy; to differentiate is a necessity of progress and one of the corner-stones

*Paper read before the fourth annual convention of the Master Steam and Hot Water Fitters Association of the United States.

of evolutionary philosophy. In the arts, as in nature, that form best fitted for the environment survives; that which is best absolutely and always no man can say; but that which is worst can be improved by discussion and experiment; the result is knowledge.

Let us commence with estimates: there were eight bidders recently on a Southern post office; A was \$9,000, B was \$8,500, C was \$8,000, D was \$7,500, E was \$7,000, F was \$6,500, G was \$6,000, and H, the successful bidder, was \$5,500. These are not the exact figures, but those who are conversant with this particular contract will recognize that they are near enough for illustration. As the concerns that bid on this work are familiar with what was required I think if you will add the eight bids together and divide by eight and get the average, you will have a fair bid for the work, which would be \$7,275; if you exclude the three highest bidders and strike an average with the five lowest this average bid should be a low bid for the work which would be \$6,500; yet the successful bidder is one thousand dollars below this—an example of variety with a vengeance.

Recently there was a contract given out in New York in which the bids ranged from \$9,000 to \$11,000. There were seven bidders. The owner of the building was a business man without preferences—except preferring to get the most for his money. There was to be furnished 6,500 feet of surface in direct radiators, two 75 horse power tubular boilers, with everything that goes into a plant of this character. In this case the lowest bidder also got the work, and the other bidders, who had spent their time advising and negotiating with the owner, got something to think about.

In alluding to this subject I feel like apologizing, as this is such an old, old story, but it is one that a little discussion of may prove interesting. In regard to details—one concern makes full working drawings for all work and gives the steam-fitter a specification to work from; others have the foreman lay out work and dispense with drawings, except the use of the architects' plans, perhaps; one concern cuts all its pipe to dimensions in the shop—risers, mains and everything; other concerns cut everything on the job, the largest as well as the smallest pipe; others again pursue a middle course, cutting all pipe above 2½ inches in the shop and all below that size on the job; one concern sets its boilers with a return flue over the top (I am now speaking of the ordinary return tubular boiler); another condemns this practice; one lines the fire-box back of the bridge wall as well as in front of it with fire-brick; the majority only line in front. A & Co. have domes on all their boilers; G & Co. never use them. X uses a straight bridge wall, and H uses a curved one. J feeds through a top feed, and K through the blow-off in the back. Then with size of main pipes (I am now speaking of an apparatus with reduced pressure and exhaust combined, say, with 5,000 feet of radiator), B starts the steam main with 4 inches and ends with 2 inches, while C starts with 6 inches and ends with 3 inches. C has a 3-inch return main, and B a 2-inch. X uses a reducing valve the full size of his pipe without a bye pass; C puts in a bye pass and uses a reducing valve half the size of his pipe, while H uses a bye pass half the size of his pipe and reducing valve full size. X uses a pump governor to control the pump returning condensation; C uses a drip tank and lets the engineer control the pump; X puts on a noiseless back pressure valve, and C puts on an ordinary one; one uses a separator on his steam pipe to the engine and a grease extractor on his exhaust pipe to heating system; others leave them off; one uses a continuous main pipe dripped only at the end, while the other has a drip from every riser. Shall we run a steam riser and a return riser and an air line, and how shall we connect our radiators? Shall we run the three risers, and on every floor where we take on a radiator connection run all around to the far end of the radiator, even on the second floor as on the top, to allow for expansion? Shall we use the single or double pipe? Shall we run an air line? Shall connections to radiators be taken above the floor or beneath it or under the ceiling? Chicago takes them above the floor, New York beneath the floor and Buffalo under the ceiling. A curious thing about Buffalo practice is the single pipe system with two valves on the radiators—the two-valve single pipe system, as it is called; this is equalled by a well known concern that puts a single valve with the two-pipe system, a double riser and only one

valve on the radiator, and in Philadelphia they put a check valve on the return end of the radiator, using the double pipe.

The writer's creed, as a steam-fitter, is about as follows:

- 1st. I believe the water tube boiler superior to the fire tube.
- 2nd. I believe the sectional radiator superior to the solid base radiator.
- 3rd. I believe the single pipe system superior to the double pipe for all purposes.
- 4th. I believe every high pressure or reduced pressure apparatus should have a pump governor and also a boiler water level regulator.
- 5th. I believe in an open feed water heater.
- 6th. I believe good steam heating is better than good hot water heating, and that there is more skill required for the design and erection for the best steam heating than there is for the best hot water heating.
- 7th. I believe the hot blast system or, as it is sometimes called, the fan system, is the proper system for public buildings.
- 8th. I believe every exhaust pipe should have a grease extractor and every engine pipe a separator.
- 9th. I believe a steam dome on a tubular boiler an absurdity.
- 10th. I believe it requires an exceedingly clever man to be the lowest bidder and make his business pay and acquire a reputation for good work.

In conclusion let us hope there will be always variety enough to make the life of the thermic engineer interesting.

MANUFACTURES AND MATERIALS

A company is being formed at Waterloo, Ont. for the purpose of constructing asphalt pavements.

Messrs. Fitzgerald & Minninnick are forming a joint stock company at Hamilton, Ont., with a capital of \$50,000, to manufacture ornamental tiles for architectural purposes.

The Trinidad Asphalt Company, of Toronto, limited, has been incorporated with a capital stock of \$100,000, divided into one thousand shares of \$100 each. Charles Riordan, A. Scott Irving, John Ellis, M. J. Adams, W. M. Hall and M. F. Brown compose the company.

The Laprairie Pressed Brick and Terra Cotta Company is being organized, with a capital of \$150,000. The promoters are: Messrs. Peter Lyall, of Montreal, Hugh Cameron, of Toronto, Archibald Dunbar Taylor, of Montreal, Thos. Auguste Brisson, of Laprairie, William Johnson, of Montreal, Thomas Henry Rothwell, of Goderich.

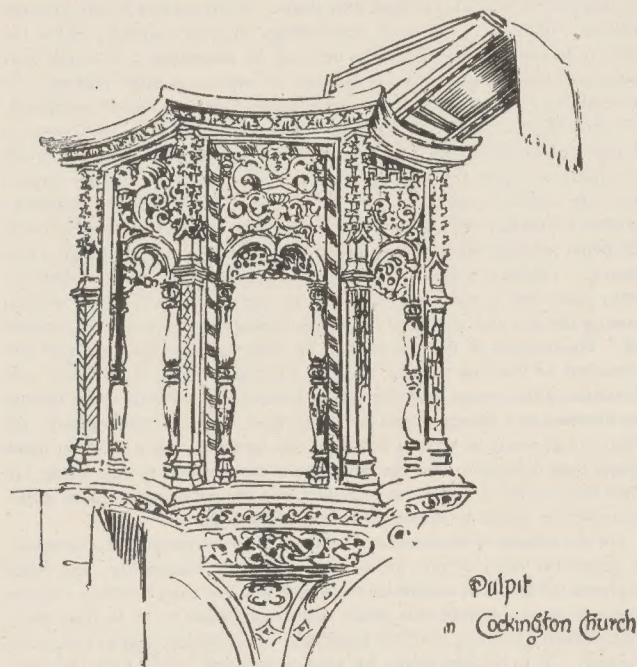
Mr. Crauston A. Stark, of Winnipeg, has recently patented an artificial stone paving tile or block, composed of Portland cement and sand, made plastic with water, and comprising two layers, one layer consisting of equal parts of cement and sand, and the other layer two parts or more of sand to one part of cement, both layers united by pressure in a plastic state in a mould forming the shape of the tile.

Application has been made for letters of incorporation for the Kramer-Irwin-Roach Asphalt and Cement Paving Company (limited), of Hamilton, with a capital stock of \$10,000. The proposed incorporators are: Herman Kramer, Buffalo, and Thomas Irwin, John T. Irwin, W. J. Kingdon and J. F. Monck, of Hamilton. The object of the company is to construct pavements of German asphalt, and it has applied for and received permission to lay down a specimen piece of roadway so that citizens may have an opportunity to judge of its merits.

E. B. Bullerworth, Ottawa, Ont., has been granted a patent on a warm air furnace, which consists of the combination of a fire pot having angular corrugations, some of which have their edges extended to form flanges, an oblong base, containing grate, ash doors, and draft damper, cylindrical combustion chamber, having a shell consisting of angular corrugations provided with fire door and down flue, a conical top or dome, a deflector suspended from said dome, a down flue attached to the combustion chamber having branch, with damper; a radiator attached to the down flue and partly surrounding the fire pot, branch pipe attached to said radiator and provided with check damper, and the pipe rising from the branch and connected with the branch and the enclosing casing.

As far as research has been able to determine, glass was in use 2000 years before the birth of Christ, and was even then not in its infancy by any manner of means. In the Slade collection of the British museum there is a head of a lion moulded in glass, bearing the name of an Egyptian king of the 11th dynasty. This is the oldest specimen of pure glass bearing anything like a date now known to exist. The invention now known as "bleezing," the mode of varnishing pottery with a thin film of glass is believed to date back to the first Egyptian dynasty. Proof of this is found in the pottery beads, glass glazed, found in the tombs of the age above referred to. Dr. Schliemann found bits of glass in his excavations at Mycenæ, though Homer does not mention it as a substance known in his time. The most eminent Egyptologists place the date of the first use of glass at a period too remote to be given in years.

DECORATION AND FURNITURE



DECORATION.*

And now, to come to my special subject, I will give some hints as to the best manner of treating a middle-class dwelling, and will begin at the entrance hall. Of course there are many ways of dealing with this, as with every other part of the house, so I must give several modes of treatment. It has long been the custom to treat the hall and staircase as unimportant parts of the house, to give them little or no attention, and so they have presented a naked, cold, and uninviting aspect—places to be hurried through as quickly as possible. The ceilings have been left white, and the walls painted one plain unbroken tint of drab or stone color. The visitor obtains his first impression of the house on entering the hall, and it is desirable he should be well impressed. We may first consider the ceiling. It should not be pure white, as garnish whiteness is out of accord with all other coloring—that is, in connection with house decoration; the whiter your shirt-fronts are the better. Well, the ceiling may be painted some shade, such as light vellum or fawn color, or some shade of blue, neutral in tone, such as the shade presented in the duck-egg shell. The ceiling tint will be regulated by the coloring of the walls. This toning of the ceiling is good as far as it goes, but there is no limit to the various ways it may be decorated. Stencilled ornament is one of the less expensive modes. And here, in speaking of stencilled ornament, it must not be thought that this is necessarily a “cheap and nasty” mode of ornamentation because we are all familiar with wretchedly designed and executed work of this kind. A stencil is a design cut in firm paper, cardboard, or tinfoil, and the color is stamped through the openings in the manner of printing. Now all printing is not artistic, yet the capital letters in old Italian and German books are full of artistic design—yet they are printed, too. So with the stencil plate. It first of all has to be designed, and the highest powers of draftsmanship may be brought to bear in the production of high-class stencil work. The same design may be traced directly by hand, but the stencil plate is used as a quicker method of obtaining like results. The reason why so much work of this kind is inferior is simply because it is difficult to do it well. Preston Town Hall, in England, decorated by Heaton, Butler and Bayne, the eminent glass-stainers and decorators, is nearly all stencilled work, but yet it is one of the best decorated halls in England. I do not recommend stencilled in place of hand-painted work; where money is forthcoming, I prefer to do the latter. But to return to the hall ceiling. It is a simple and inexpensive way of getting a pleasing effect to put a band of well-designed ornament round the ceiling, its breadth being regulated by the size of the vestibule or hall, and there is no reason why the centre of the ceiling should not be covered with a simple geometrical design in quiet colors, and treated flatly, without light or shade. A little gilding introduced in small spots and thin lines defining the leading forms of the diaper or panelling has a very good effect, but there is no limit to the richness and quality of design that may quite fitly be expended here. Besides that, there are many alternative modes of treatment besides painting. There are beautiful paper hangings specially designed for ceilings, besides several embossed or raised materials each as Tynecastle tapestry, Anaglypta, and Japanese leather papers, which when harmoniously colored produce most pleasing effects. The cornice should be colored to connect the ceiling and walls, care being taken to use light shades where the mouldings and enrichments are delicate. The treatment as to the division of the walls will depend on the height of the ceiling, but generally speaking it is good to put a frieze under the cornice, and it is

useful to have a dado here, and in the staircase following the rake of the handrail. The dado and wall space should be separated by a wooden moulded rail. The dado should be highly varnished, so as to allow of washing and dusting without the risk of soiling. The color of the walls should be pleasantly warm, such as terra-cotta, or even Pompeian red, the dado in deeper shades of the wall color; soft olive green is also good for staircase walls. Blue, unless it is of the peacock shade, or approaching a grey green, had better be avoided here. The steps of stairs if of wood, should be stained a deep walnut color, or if they be of stone they may be painted a deep shade of the dado color, and varnished to allow of cleaning frequently. The hall and staircase walls may be papered—there are special designs made for the purpose that look very well indeed, having friezes and dados specially colored to match. The hall is a good place to hang etchings, autotypes, and engravings, in quiet oak or black moulded frames; and when they form a special feature of the decoration, the walls should be painted a quiet shade, as a florid patterned paper detracts from the value of the pictures. The carpets and portières should be in strict harmony with the decorator's work, and should be chosen by him or the architect. I have often seen the whole harmony of coloring in a house destroyed by the unskilful selection of the carpets and hangings. The woodwork should be painted in one or more shades of maroon or other rich brown colors and varnished, all graining should be avoided. I must confine myself to broad principles as I proceed, as I could multiply varieties of treatment without end. The dining-room should be sombre in tone, the ceiling a vellum color in depth to suit the walls. It may be divided by wood mouldings into geometrical panelling, and these panels filled with Tynecastle tapestry or Anaglypta, the effect of this is as if it were executed in low-relief plaster work. The designs manufactured now are very beautiful. If the ceiling is treated in this manner, the walls may also be decorated with the same materials, for there are friezes and wall hangings made of the same stuffs. The painting and gilding on those surfaces can be as simple or as grand as may be demanded, they are capable of many and varied beautiful treatments. Immediately under the frieze should be fixed a moulded picture rail; this is much better than a metal rod, as it goes round the entire room as the cornice does; its distance from the cornice will depend upon the height of the walls. The advantages of lowering the picture rail is that it affords greater ease in hanging the pictures, and prevents the unsightly cords being seen to the same extent as when going to the cornice; by shortening the cords, too, pictures hang steadier and the chances of breakage are lessened. This moulding can be colored to be in harmony with the walls and rendered almost invisible, or it may be gilt solid so as to form a marked boundary to the frieze. The coloring of the walls should have reference to the pictures, and should not be too light in tone; experience has discovered that dark reds or old gold color, not unlike rich brown paper or dull tones of green, either cool and grey, or warm and brown, are the best for showing pictures to advantage. I painted the dining rooms of two of the Royal Academicians in London, J. Pettie's and McWhirter's, and in both cases the color selected was a dark grey-green; both artists found the full value of the coloring of their pictures brought out to the fullest extent on this dark background. The Royal Academy walls are colored a dark Indian red, and so also are the walls of the British National Gallery. As chairs are placed round the walls of the dining room, it is good to put a chair-rail at the height of the chair-backs; this prevents the chairs from breaking the plaster. The dado should be colored in relation to the walls above, and a good many shades darker; the dark dado takes from the bareness of a large room, and gives a coziness and furnished appearance which does not exist when you can see each piece of furniture clearly defined against the walls. The woodwork should be painted good solid colors of Indian red or walnut shades, or black and resembling ebony. I do not recommend decorating the panels with any kind of natural flower designs; thin flat hand-painted ornament in ivory color, resembling, but not imitating, inlaid work, is chaste and beautiful. If the wood is of good quality the panels may be decorated with various stains in full and rich designs as shown in samples here. I have decorated the saloons of many of the great ocean steamships in this manner. It is best to French polish surfaces decorated in this way.

As yet I have dealt with the ceilings and walls as covered with embossed materials, either in low or high relief. The ceilings, where dust cannot settle, may safely have the designs in high relief, but those in low relief are more suited to the walls. The walls themselves may be formed into well proportioned panels, not so small as to interfere with the placing of the furniture or the hanging of the pictures. The panels should be divided by wood mouldings and there should be a style round each treated in flat tints of such a kind as to show the panel colouring to the greatest advantage. The French are partial to the mode of treatment, and I think it a very good one; it gives a rich furnished appearance to the walls. Both ceilings and walls may again be oil-painted and decorated in a hundred ways; I have painted many of the finest houses in Scotland in this way, the ceilings being entirely decorated by hand with figures, wreaths, and ornamental compositions, the walls also being decorated with the like specially designed and hand-painted ornament. This is the most artistic manner, and no two houses are ever painted in the same way. Of course, ordinary wall papers may be applied here as everywhere else in the house, and if chosen by an expert, very fine effects may be obtained in this manner. I don't think there is a wiser way of spending money than in making the home beautiful. Our wives and families spend most of their lives at home, and the enjoyment derived from beautiful surroundings is beyond estimate, besides the refining influence it has on our children. There is no pleasure so constant, so soothing, so lasting and elevating as that afforded by a lovely home; it

*Abstract from a paper read before the Sydney, N. S. W., Architectural Association, by Mr. Andrew Wells.

is the most unselfish pleasure, too, as all our friends may share it. In a room where there is heavy furniture it is good to have a margin of say goin. round the floor uncarpeted, so as to allow of the carpet being frequently taken up and shaken. This margin may be painted in some dark shade agreeing with the carpet and dado, or if the floors are new they may be stained to a dark oak or walnut color, and in both cases varnished. Wax varnish is most artistic in effect, but is more liable to soil and takes much more labor to keep in good order, and parquet flooring is better than either of the former, but is more expensive.

The drawing-room is the ladies' special room, and should be bright and cheerful. It is difficult to deal with a subject like color to make you realize effects from mere description, and to describe in detail the many ways I could treat a drawing-room would merely confuse you, so I will be general in my remarks. All the materials described for the dining-room treatment would be applicable for the drawing-room. The dado is not so necessary here, as the chairs are not usually placed against the walls, and instead of the sombre hues suited to the dining-room, soft quiet, and light effects are best—say cream or soft duck-egg shell blue or French grey for ceilings, the walls fawn color or a richer French grey or a deeper grey blue, approaching peacock shade. All these are good for showing ladies' complexions and dress to the best advantage, and that is a consideration not to be overlooked. Water-color drawings will also look well on these grounds. The woodwork may be cream-white finished with enamel varnish; this gives a beautiful smooth and fresh effect. I think the judicious application of gilding in this room very advantageous, but the same remark applies to all the public rooms and hall. I think it is better to gild the small enrichment of cornices solid than to break up the ornament of the large enrichments with points of gold—what is technically called "hatching" or "picking out." The round, the concave, and small ogee mouldings always look well gilded, as their rounded surfaces catch the light from all points. The wall should be decorated with water-color drawings or etchings tastefully arranged. Choice pieces of Oriental and Doulton pottery are beautiful and very decorative. I have fitted a narrow moulded shelf, supported on neat brackets, all round the walls—except where occupied by cabinets—about 4 ft. high from the floor; this shelf having a groove on the upper surface for holding plates and photos—this is to prevent them from sliding—and is a very pretty arrangement, as between the photos pretty pieces of pottery and statuettes may be placed. Above this shelf should be hung the water-color drawings, etchings, and engravings; or, instead of this narrow shelf, dwarf book-cases rising 3 ft. high may be put round the room, and on the top of those the photos and ornaments may be placed. Books in themselves are very decorative in effect, besides the delight of sitting in rooms supplied with plenty of them. I think there should be many books in the drawing-room; it is the general sitting-room, and no one need ever be weary or suffer ennui who loves good books.

The morning-room I will not describe further than to say it should be light and cheerful and cool in tone. French greys and light hues are good. It may be painted entirely and decorated in a simple manner, or any of the wall coverings may be used here quite fitly.

The library is better to be subdued in tone, but not gloomy. The wall should be the background for rare prints and etchings, so should be painted or, if paper, some old rich leather effect is good with a pattern not over conspicuous, the ceiling and cornice colored to match and the woodwork as in the dining-room, dark and decorated with thin lines and ornament. The books should be easily accessible, and low book cases not more than five feet high or lower look very well. I think it is better to have no glass in front of the books, except to protect the rarest of very valuable ones. I have observed that those placed beyond reach of the hand are rarely opened. The floor should be stained or painted all round, say one foot in front of the book cases, so that carpet or rug may be lifted without disturbing the book-cases.

The bed-rooms should be dealt with as to color according to aspect, those getting much sunshine should be cool, and those in the shade warm in tone. I think it good to paint the ceilings and walls of bed-rooms. The walls may be finished with a dull gloss, the paint being partly mixed with varnish; this allows of their being washed down without injury to the paint, and insures that they be always fresh and clean. Walls painted in this manner will last a life-time. The walls and ceilings may be perfectly plain, but there is no reason why the ceilings may not be decorated in a simple way with lines, borders and corner ornaments, or even in a fuller manner. In the children's rooms it is as well to have dados that may be fully varnished; of course the walls may be papered without any breach in the fitness of things, and lovely papers are to be had in plenty, and some are made purposely to allow of sponging down. They are called sanitary papers, they are quiet in color and very serviceable. The woodwork should be painted to suit the walls, generally in light tones, and if varnished so much the better; it lasts much longer and all finger marks can be easily wiped from it. I think it is best to oil paint the ceiling in all cases, it lasts for many years and is easily cleaned, and if renewed can be done without causing the dirt and mess that distemper always produces, when washed off. The margins of floors should in all cases be stained or painted and varnished, so that the carpets may be frequently shaken; freshness and cleanness in bed rooms is of the utmost importance. For the same reasons the kitchens and offices should be oil painted, and not distempered; the paint can so easily be washed down by the servants, and it lasts so much longer than distemper, that the difference in the first cost is soon made up. Here the woodwork should be varnished, and the walls for 5 ft. up the same; a simple line should be drawn at the top of the dado.

For the outside of cemented houses there is no treatment that so effectually resists the entry of rain as to paint the walls thoroughly, and when applying the last coat to powder them with fine dry sand. When dry this makes so hard a surface that water cannot penetrate it; it is more costly than ordinary painting, but it is practically imperishable, and so cheaper in the end. As to the best colors for outside painting, I don't feel that any hard and fast rule can be laid down. All tones of stone color, from cream yellow to terra-cotta and dark chocolate, may be used. I would avoid shades of green and blue on the cement, except they be very neutral in tone; from white through yellow tones to dark red and brown are the most suitable shades. When the walls are painted dark colors, then the window sashes and verandah should be made very light, say, white tinted with yellow, green or blue or even pure white; on the other hand, if the walls are painted in light colors, the window sashes and other outside woodwork may most fitly be painted in dark shades, say olive green, Indian red or dark peacock blue.

The above is a very general survey of the house, but, perhaps, as much as can be profitably introduced into an hour's lecture such as this. It is impossible to do more than treat the subject on the broadest lines. I am embarrassed with too much matter rather than with too little, for practically there is no limit to the modes of treatment for every part of the house. I am far from thinking there is only one good way of painting houses; there are many. For instance, if character is wanted, the house could be treated in purely Greek design—or full of refined designing and affording scope for full harmonious coloring. The Renaissance is founded on the Classic, but treated with abundant freedom and grace by the Italians and other European nations. The various French developments of the Renaissance have their own beauties: Louis Quinze and Louis Seize are full of character, lightness and elegance. But while I have seen much of this high-class work, and executed some, the ever-present regret one feels in the colony is that so little of it is in demand. The country is probably too young, and feels itself bound to be content with humbler things until it can afford better. But of one thing I do complain: it is the system of tendering for every kind of work. Every contractor is assumed to be equally able to do artistic work; cheapness is held to be the criterion of merit and not quality. Things are different in England. A man of merit there is treated with respect, and his worth is acknowledged. I suppose things will improve here as we develop a richer and more leisured class. As this class grows, so the appreciation for Art work of every description will grow with it—a consummation devoutly to be wished!

ROOFING AND PAVING MATERIALS

TARRED FELT, 2 and 3 ply,

BUILDING PAPERS,

COAL TAR, PITCH,

DEAFENING FELTS.



ALEX. McARTHUR & CO.

650 Craig Street, Montreal.

Factory:

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Streets, Montreal.

Joliette, Que.

The following two cements are of considerable value in caulking hot water pipes: (1) Two parts of ordinary well-dried powdered loam and 1 part of borax are kneaded with sufficient water to a smooth dough, which must at once be applied to the joints. After exposure to heat, the cement adheres even to smooth surfaces so firmly that it can only be removed with a chisel. (2). Mix 430 parts by weight of white lead, 520 of powdered slate, 5 of chopped hemp, and 45 of linseed oil. The two powders and the hemp, cut into lengths of about 1/4 in., are mixed intimately, the linseed oil gradually added; and the mass is then kneaded until it has attained its uniform

consistency. It is claimed that the preparation keeps better than ordinary red lead cement.

A practical plumber, in a communication to a foreign contemporary, considers that the best working solder for plumbers is made of two parts of pure lead and one part of tin, and to test its quality he would well stir the solder in the pot, and then take a ladleful out and pour it upon a clean dry, level stone, and if the metal has a dull white appearance on both sides, it is too coarse, and needs additional tin; if the metal is closely covered with spots, it is a sign there is too much tin in it; but if the metal has but few spots here and there upon the upper surface, it will be in good condition.

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BRONZE AND OTHER ELECTRO-FINISHES

ARCHITECTURAL
WORK OF ALL KINDS.
IN WROUGHT
AND CAST IRON.
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R. DENNIS.
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